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3611

#26 Appeal Brief 2-18-04 SW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Ruppert et al.	Art Unit: 3611
Serial No.:	09/781,795	Examiner: Vanaman, F.
Filed:	February 12, 2001	
For:	LOW FLOOR DRIVE UNIT ASSEMBLY FOR AN ELECTRICALLY DRIVEN VEHICLE	

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Subsequent to the filing of the Notice of Appeal on November 25, 2003, Applicant hereby submits its brief. Fees in the amount of $330.00 are paid by the attached check. Any additional fees or credits may be charged or applied to Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds.

Real Party in Interest

The real party in interest is Meritor Heavy Vehicle Systems, LLC, the assignee of the entire right and interest in this Application.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 23-41, 43-46, 48-55, and 57-58 remain in the application including independent claims 23, 41, and 48. Claims 42, 47, and 56 have been cancelled. Claims 41 and 43-46 are allowed. Claims 29-37, 40, 49-55, and 57-58 are indicated as allowable.

Claims 23-28, 38, and 39 stand finally rejected under 35 U.S.C. 102(b) as being anticipated by French Patent Application No. 2507550 to Van Dest et al. (Van Dest).

Claims 23, 26, 32, 36, 37, and 40 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 3161083 to Roe (Roe). The examiner has indicated in the Interview Summary, dated October 9, 2003, that the rejection of these claims based on Roe would be withdrawn. As the Roe rejection for claims 32, 36, 37, and 40 is the only rejection for these claims, it follows that claims 32, 36, 37, and 40 would also now be allowable.

Claim 25 stands finally rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 3161083 to Roe (Roe) in view of United States Patent No. 5419406 to Kawamoto et al. (Kawamoto).

Claim 48 stands finally rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 2093859 to Austin (Austin) in view of United States Patent No. 2589863 to Quartullo (Quartullo) and further in view of French Patent Application No. 2507550 to Van Dest et al (Van Dest).

Appellant hereby appeals the rejections of claims 23-28, 38, 39, and 48.

Status of the Amendments

All amendments have been entered.

Summary of the Invention

Applicant's invention relates to a unique electric drive arrangement for vehicle wheels that improves passenger access to the vehicle. Mass transit vehicles, such as a buses or trolley cars, typically have seats aligned at the lateral sides of the vehicle, with a central aisle extending along the vehicle. The seats are typically at a higher vertical location than the aisle and the vehicle floor is typically raised above the wheels and other driveline components to avoid any interference therewith. In order to facilitate entry and exit into the vehicle it is important to have the aisle and vehicle floor positioned as low to the ground as possible. This provides increased passenger space within the body of the vehicle and provides the option of reducing the overall height of the mass transit vehicle. Another advantage to having a lower floor position is improved handicapped access. Page 1, lines 8-15.

Mass transit vehicles typically have several axles, which support and drive and/or steer the vehicle. If the axle is a driving axle, then electric motors can be used to generate torque to drive the wheels. In a typical configuration, a centrally located electric motor drives two opposed wheels at the sides of the vehicle by way of a conventional axle. Usually, transmissions or drive shafts extend from the central motor to the axle. In the prior art, these motor, transmission, and axle elements are directly located below the center of the vehicle. The vehicle floor is positioned above the axle and other components, resulting in the floor being relatively high. Page 1, lines 16-23.

Applicant's unique electric drive configuration is utilized in an automotive vehicle 10 includes a passenger compartment 12 defined by a roof 14, two side-walls 16, and a vehicle floor 18. A pair of wheels 19, 21 are driven by an automotive vehicle drive unit assembly 20, which has a first unit 22 and a second unit 23. The first unit and second units 22 and 23 define an axis of rotation 26. The first unit 22 includes a first driving axle shaft 24 used to drive a first wheel hub 28, which revolves about the axis 26 of the first driving axle shaft 24. A first gear set 30, located adjacent to the first wheel 19, is comprised of a pinion gear 32 and a ring gear 34 that together drive the first wheel hub 28. Page 3, line 18 through Page 4, line 5.

A first electric motor 36, defining a motor axis of rotation 38, is mounted at a non-parallel angle relative to the axis of rotation 26 of the first driving axle shaft 24. The first electric motor 36 is shown mounted in a horizontal position such that the motor axis of rotation 38 is parallel to the vehicle floor 18 and is perpendicular to the axis of rotation 26 of the first driving axle shaft 24. Page 4, lines 5-9.

The second unit 23 includes a second driving axle shaft 24, a second wheel hub 28, a second gear set 30, and a second electric motor 36. The second unit 23 is a mirror image of the first unit 22 and operates in a similar manner. A beam 58 provides a fixed support and includes a housing that extends between the first 22 and second 23 units. Page 4, lines 10-14.

The first and second electric motors 36 can be mounted in various different positions relative to each other including being mounted in a generally horizontal position with both electric motors 36 extending forwardly from the beam 58, being mounted such that the electric motors 36 both extend rearwardly from the beam 58, or being mounted such that the first electric motor 36 extends in a forwardly direction relative to beam 58 while the second electric motor 36 extends in a rearwardly direction relative to beam 58. Arranging the configuration so that one electric motor 36 extends forwardly while the other electric motor 36 extends rearwardly can resolve electric motor weight balance issues that arise when both motors extend in the same direction from the beam 58. Page 4, line 14 through Page 5, line 2.

In order to achieve a more compact configuration, the first unit 22 can include a third electric motor 56, in parallel driving relationship with the first electric motor 36 to drive the first gear set 30. In this configuration the second unit 23 is a mirror image of the first unit 22, and includes a fourth electric motor 56, in parallel driving relationship with the second electric motor 36 to drive the second gear set 30. The use of a third 56 and fourth electric motor 56, where packaging space is available, allows smaller gears and motors to be used, thus reducing the necessary size for the system. Page 7, lines 1-8.

The first and second gear sets 30 are housed within gear-boxes 40 that are rigidly connected to the respective motors 36. A planetary gear set 46 can be used to achieve greater overall gear reduction. The planetary gear set 46 can either be located adjacent to the wheel hub 28 (Figure 4) or can be incorporated into the gear-box 40 (Figure 8). The planetary gear set 46 includes a sun gear 48, planet gears 50, and a ring gear hub 52. The planet gear assembly is inserted into the ring gear

hub 52 such that the teeth of the planet gears 50 mesh with the teeth of the ring gear hub 52. Page 5, lines 3-19.

Incorporating the planetary gear set 46 into the gear-box 40 is a unique location for the planetary gear set 46. Typically, this location has been used by a differential, which includes a ring gear and a pinion gear that drive axle shafts. With independent electric motors 36 there is no need for a differential or for any direct mechanical link between opposing wheels. By incorporating the planetary gear set 46 into the gear box 40, the need for a planetary hub 54 is eliminated which decreases the vehicle weight, gives a broader selection of wheel equipment and wheel end features, and reduces overall cost. Page 6, lines 7-15.

By mounting the motors at the sides of the vehicle, the center of the vehicle floor may be lowered significantly than compared to the prior art. In addition, since the motors themselves are connected to drive the wheels at a non-parallel angle, they do not extend towards the center of the vehicle from the wheel for any undue amount. Thus, the lower floor can begin at a laterally outer position. Page 7, lines 10-14.

Issues

Is the rejection of claims 23-28, 38, and 39 proper under 35 U.S.C. 102(b) based on French Patent Application No. 2507550 to Van Dest et al. (Van Dest)?

Is the rejection of claim 25 proper under 35 U.S.C. 103(a) based the combination of United States Patent No. 3161083 to Roe (Roe) in view of United States Patent No. 5419406 to Kawamoto et al. (Kawamoto)?

Is the rejection of claim 48 proper under 35 U.S.C. 103(a) based on the combination of United States Patent No. 2093859 to Austin (Austin) in view of United States Patent No. 2589863 to Quartullo (Quartullo) and further in view of French Patent Application No. 2507550 to Van Dest et al (Van Dest)?

Grouping of Claims

A. The rejection of independent claim 23 and dependent claims 38 and 39 is contested.

B. The rejection of dependent claim 24 is separately contested, i.e. claim 24 does not stand or fall with claim 23.

C. The rejection of dependent claim 25 is separately contested, i.e. claim 25 does not stand or fall with claim 23.

D. The rejection of dependent claim 26 is separately contested, i.e. claim 26 does not stand or fall with claim 23.

E. The rejection of dependent claim 27 is separately contested, i.e. claim 27 does not stand or fall with claim 26.

F. The rejection of dependent claim 28 is separately contested, i.e. claim 28 does not stand or fall with claim 27.

G. The rejection of independent claim 48 is separately contested, i.e. claim 48 does not stand or fall with claim 23.

Patentability Arguments

A. Claims 23, 38, and 39

Claims 23, 38, and 29 stand rejected under 35 U.S.C. 102(b) as being anticipated by Van Dest.

Claim 23 is directed to:

An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation; and

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation.

The examiner argues that Van Dest discloses first and second wheels 1 mounted on hubs 2, which rotate about a lateral axis of rotation 22, and first and second motors 11 mounted on a common axle housing 23, which drive first and second gear sets (13, 14, 15, 18). The examiner further argues that Van Dest discloses first and second planetary gear sets (6, 7, 8) that are driven by the first and second gear sets.

First, the motors in Van Dest do not define first and second longitudinal axes of rotation. As shown in Figure 4, the motors in Van Dest are clearly shown extending in a vertical direction, not a longitudinal direction. Thus, the motors in Van Dest define fist and second vertical axes of rotation.

Second, even assuming, *arguendo*, that the motors in Van Dest do define longitudinal axes of rotation, these longitudinal axes of rotation are not transverse to the lateral axes of rotation defined by the driving axle shafts. As discussed above, the examiner argues that shafts 22 define the lateral axis of rotation. The examiner further argues that the motors 11 define first and second longitudinal axes of rotation, defined by motor output shafts 12, which are transverse to the lateral axis of rotation 22. It is clear from Figures 2, 3, and 4 of Van Dest that the examiner's longitudinal axes of rotation are not "transverse" to the lateral axis of rotation.

According to the New College Edition of The American Heritage Dictionary of the English Language (Houghton Mifflin Company, 1979), the definition of "transverse" is: "A line that intersects a system of lines; . . . Situated or lying across; athwart; crosswise." The longitudinal axes of rotation in Van Dest, defined by the motor output shafts 12, extend in a

vertical direction and are positioned on opposing sides of the lateral axis of rotation, defined by shafts 22. The motor shafts 12 do not lie across, do not intersect, and are not positioned cross-wise to the shafts 22. Contrast this with Figures 3-8 of Appellant's application, which clearly show that the longitudinal axes of rotation, defined by motor output shafts 42, lie across and intersect the lateral axis of rotation 26, defined by axle shafts 24.

Thus, Appellant asserts that the rejection of claims 23, 38, and 39 under 35 U.S.C. 102(b) is improper.

B. Claim 24

Claim 24 stands rejected under 35 U.S.C. 102(b) as being anticipated by Van Dest. Claim 24 includes the feature of the planetary gear sets being incorporated into the wheel hubs.

The examiner argues that Van Dest discloses the planetary gear set (6, 7, 8) being incorporated into the wheel hub 2. Appellant disagrees. The planetary gear set 6, 7, 8 is clearly not positioned or incorporated into or inside of the wheel hub as claimed by Appellant. According to the New College Edition of The American Heritage Dictionary of the English Language (Houghton Mifflin Company, 1979), the definition of "into" is: "To the inside of." Figure 4 of Appellant's application clearly shows the planetary gear set being incorporated inside of the wheel hub.

The wheel hub 2 in Van Dest is the planet wheel carrier and has the planet wheels 7 positioned outside of the wheel hub 2 on one laterally exposed side face. Further, the ring gear 6 is fixed to the non-rotating stub shaft 3 and surrounds an outer circumference of the hub 2. Thus, the planetary gear set 6, 7, 8 is clearly not incorporated inside the wheel hub. The only planetary gear

component in Van Dest that is arguably positioned inside the hub is the sun gear 8, but this component alone does not form the planetary gear set.

Thus, for the reasons set forth above, in addition to the reasons set forth above in Section A, Appellant asserts that the rejection of claim 24 under 35 U.S.C. 102(b) is improper.

C. Claim 25

Claim 25 stands rejected under 35 U.S.C. 102(b) as being anticipated by Van Dest. Claim 25 also stands rejected under 35 U.S.C. 103(a) as being unpatentable over Roe in view of Kawamoto.

Claim 25 includes the additional features of a first gearbox for housing the first gear set and a second gearbox for housing the second gear set with the first and second gearboxes being mounted to the first and second electric motors respectively and wherein the first and second planetary gear sets are incorporated into the first and second gearboxes.

In an interview summary dated October 9, 2003 the examiner has indicated that the Roe reference does not disclose, suggest, or teach the limitation of planetary gear sets being driven about a lateral axis of rotation as defined in claim 23. Kawamoto, which the examiner solely relies on for the teaching of mounting a gear set into a gear box mounted to the motor, also does not disclose, suggest, or teach the mounting planetary gear sets being driven about a lateral axis of rotation as defined in claim 23. Further, Kawamoto does not disclose suggest or teach mounting a planetary gear set having the configuration set forth in claim 23 into a gearbox mounted to a motor having the configuration set forth in claim 23. Thus, Appellant asserts the rejection of 25 under 35 U.S.C. 103(a) is improper and must be withdrawn.

With regard to the 35 U.S.C. 102(b) rejection, the examiner argues that Van Dest teaches mounting the planetary gear sets into gearboxes 3, 10. The examiner has previously argued that Van Dest teaches mounting the planetary gear set into the wheel hub, see claim 24. Van Dest only shows one embodiment. It is difficult to see how Van Dest could disclose planetary gear sets being incorporated into both the wheel hub and into gearboxes.

The examiner argues that Van Dest teaches "plural gear boxes (3, 10) for housing the first and second gear sets, the motors being mounted to the gear boxes (figure 2), the planetary gears being incorporated into the gear boxes (at 3)." The examiner has ignored the specific claim language of claim 25. Claim 25 requires a first gearbox for housing the first gear set and a second gearbox for housing the second gear set. The examiner has indicated that the first and second gear set comprise gear sets 13, 14, 15, 18, which are coupled to each of the motors 11. Both the first and second gear sets 13, 14, 15, 18 in Van Dest are housed within the same central housing 10. The planetary gear sets 6, 7, 8 are mounted within stub shafts 3 that are positioned on opposing sides of the central housing 10.

For the examiner's interpretation to have merit, one gear set 13, 14, 15, 18 and one planetary gear set 6, 7, 8, would have to be housed in one gear box 10 and the other gear set 13, 14, 15, 18 and the other planetary gear set 6, 7, 8, would have to be housed in component 3 to meet the limitation of first and second gear boxes. Van Dest clearly does not disclose this configuration. At best, Van Dest discloses a first gearbox 10 for housing first and second gear sets 13, 14, 15, 18, a second gear box 3 (stub shaft left side) for housing one planetary gear set 6, 7, 8, and a third gear box 3 (stub shaft right side) for housing the other planetary gear set 6, 7, 8. This configuration is very different than that set forth in claim 25. Thus, for the reasons set forth

above, in addition to the reasons set forth above in Section A, Appellant asserts that the rejection of claim 25 under 35 U.S.C. 102(b) is improper.

D. Claim 26

Claim 26 stands rejected under 35 U.S.C. 102(b) as being anticipated by Van Dest. Claim 26 further includes the first gear set having a first pinion gear in driving engagement with a first ring gear mounted for rotation with the first wheel hub, and the second gear set having a second pinion gear in driving engagement with a second ring gear mounted for rotation with the second wheel hub.

The examiner argues that Van Dest teaches first and second gear sets having a pinion gear 13 and a ring gear 14 that is mounted for rotation with wheel hub 2. First, component 14 in Van Dest is clearly not a ring gear 14. While it is well settled that terms in a claim are to be give their broadest reasonable interpretation, this interpretation must be consistent with the specification, with claim language being read in light of the specification as it would be interpreted by one of ordinary skill in the art. In re Bond, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990). The examiner has improperly expanded the meaning to be give to the claim language "ring gear."

As shown in Figures 3-8 and as described in the accompanying specification, the first and second gear sets are comprised of a pinion gear 32 and a ring gear 34. A ring and pinion gear set includes a smaller sized pinion gear that meshingly engages a larger sized ring gear, which has teeth formed about a circumferential surface. This is most clearly shown in Figures 3 and 5 of

the subject application. The examiner's ring and pinion gear set 14, 13 from Van Dest is clearly different than Appellant's configuration.

Also as known in the art, the ring and pinion gear set for a drive axle takes high rotational speed/low torque input and converts it to lower rotational speed/high torque output for the wheel hubs. In order to accomplish this the pinion gear is smaller in size than the ring gear, i.e. there is a gear ratio reduction. A traditional ring and pinion gear set cannot be incorporated into Van Dest due to the vertical orientation of the motors in relation to the wheel hubs. Thus, Van Dest uses a second conical gear 14 to translate the vertical rotation of the first conical gear 13 into lateral rotation such that additional gear members 18 and 19 can be used to drive sun gear 8. One of ordinary skill in the art would not consider conical gear 14 in Van Dest as corresponding to Appellant's claimed ring gear of the first gear set.

Second, even assuming, *arguendo*, that conical gear 14 corresponds to the claimed ring gear, gear 14 is not mounted for rotation with wheel hub 2. The conical gear 14 is mounted for rotation with shaft 15. Wheel hub 2 is not mounted for rotation with shaft 15. Wheel hub 2 is mounted for rotation with planet wheels 7, which are driven by sun gear 8 and which react against fixed planetary ring gear 6.

Thus, for the reasons set forth above, in addition to the reasons set forth above in Section A, Appellant asserts that the rejection of claim 26 under 35 U.S.C. 102(b) is improper.

E. Claim 27

Claim 27 stands rejected under 35 U.S.C. 102(b) as being anticipated by Van Dest. Claim 27 further includes the first planetary gear set having a first sun gear mounted for rotation with the first ring gear and a first plurality of planet gears in meshing engagement with a first planetary ring gear hub and the second planetary gear set having a second sun gear mounted for rotation with the second ring gear and a second plurality of planet gears in meshing engagement with a second planetary ring gear hub.

The examiner argues that Van Dest discloses the planetary gear sets having a sun gear 8 mounted for rotation with first ring gear 14 and a plurality of planet gears 7 in meshing engagement with a planetary ring gear 6. For the reasons discussed above, gear 14 is not a ring gear. Further, sun gear 8 is not mounted for rotation with gear 14. Gear 14 is mounted for rotation with shaft 15 and the sun gear 8 is mounted for rotation with shaft 22. Gear 14 drives shaft 15. Gear 18 is mounted for rotation with shaft 15 and drives gear 19. Gear 19 drives shaft 22 and sun gear 8 is mounted for rotation with shaft 22. This is very different than Appellant's claimed configuration set forth in Figures 4 and 8, both of which show sun gear 48 and ring gear 34 mounted for rotation together.

Thus, for the reasons set forth above, in addition to the reasons set forth above in Section A, Appellant asserts that the rejection of claim 27 under 35 U.S.C. 102(b) is improper.

F. Claim 28

Claim 28 stands rejected under 35 U.S.C. 102(b) as being anticipated by Van Dest. Claim 28 includes the feature of the first planetary ring gear hub driving the first wheel hub and the second planetary ring gear hub driving the second wheel hub. Van Dest does not disclose this configuration.

The planetary ring gear 6 in Van Dest does not drive the wheel hub 2. The planetary ring gear 6 cannot drive the hub because it is a non-rotating component that is fixed to the non-rotating stub shaft 3. The sun gear 8 drives the wheel hub via the planet wheels 7, which are mounted for rotation with the wheel hub 2. In Appellant's configuration the planetary ring gear 52 rotates to drive the wheel hub, see Figure 8.

Thus, for the reasons set forth above, in addition to the reasons set forth above in Section A, Appellant asserts that the rejection of claim 28 under 35 U.S.C. 102(b) is improper.

G. Claim 48

Claim 48 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Austin in view of Quartullo and further in view of Van Dest. First, there is no motivation or suggestion to modify Austin with Quartullo. Second, there is no motivation or suggestion to modify Austin with Van Dest.

The examiner argues that it would be obvious to replace the "wheel driving engine of the vehicle of Austin with the individual electric drives taught by Quartullo for the purpose of allowing the driven wheels to be independently suspended, as suggested by Quartullo." Appellant disagrees.

A *prima facie* case of obviousness is established by presentation of evidence that would have led one of ordinary skill in the art to combine the relevant teachings of the references to arrive at the claimed invention. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). When it is necessary to select elements of various teachings in order to form the claimed invention, there must be a determination as to whether there is any suggestion or motivation in the prior art to make the combination as argued by the examiner. Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. The extent to which such suggestion must be explicit in, or may be fairly inferred from, the references, is decided on the facts of each case, in light of the prior art and its relationship to the claimed invention. It is impermissible to engage in hindsight reconstruction of the claimed invention, using appellant's structure as a template and selecting elements from references to fill the gaps. The references themselves must provide some teaching whereby the appellant's combination would have been obvious. In re Gorman, 933 F.2d 982, 986, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991).

The goal of Austin was to provide a vehicle with passenger space provided along each side wall on a plane above the wheel housing with readily accessible baggage compartments beneath the passenger space and between the wheel housings. Austin's vehicle design accomplished this goal by eliminating bulky wheel housings within the passenger carrying space to allow the seats to be raised to a higher level. "The slightly higher level of the passenger seats imparts to the occupant of a mass transportation vehicle a sense of security, and in fact is a safety factor in the event of collision because in most cases the impact will be below and out of line with the region of the passenger compartment." Col. 1, lines 35-41.

Austin also explains that the raised floor offers additional benefits. "The raised floor also provides an abundance of space beyond the rear wheel housings for the power plant of the vehicle and neither the engine nor the drive connections to the wheels interfere or occupy space useful for the payload." Col. 1, lines 45-50.

The goal of Quartullo was very different than that of Austin. Quartullo states that the object of the invention "is to provide a vehicle . . .having a relatively flat floor or bottom extending substantially from the front to the rear of the vehicle, and almost completely from side to side, the bed being substantially on the level of the axes of the vehicle wheels." Col. 1, lines 33-39. Quartullo achieved this goal by providing an independently mounted wheel adjacent teach corner of the body, a vehicle body having a flat floor at the level of the wheel axes, an engine mounted in the front, an electric generator driven by the engine, and an electric motor associated with each rear wheel having a gear mechanism connecting each motor to its respective wheel. See Col. 1, line 53 through Col. 2, line 11.

The examiner's motivation to modify Austin with Quartullo directly contradicts the teachings of the references. While Austin was seeking to raise the floor above the wheel housings, Quartullo was seeking to lower the floor to the level of the wheel axes. The examiner argues that it would be obvious to replace the wheel drives of Austin with the independent wheel drives of Quartullo. First, adding individual motors and gear mechanisms at each of the driving wheels in Austin would significantly increase the size of the wheel housings. This defeats the benefit achieved by Austin of eliminating bulky wheel housings. To increase the size of the wheel housings by adding motor components, gears, and connecting elements at each wheel, would clearly interfere and occupy space useful for payload, defeating the benefit achieved by Austin.

Second, Quartullo incorporated independent wheel drives at the driving wheels to lower the entire floor of the vehicle closer to the ground. The teachings of Austin are clearly directed to an opposite arrangement from that of Quartullo. Austin raises the vehicle floor to provide a sense of increased security to passengers and to improve design safety factors for collision. The reasons for using independent electric drives at each wheel set forth in Quartullo simply do not apply to the drive configuration in Austin. Incorporating independent electric drives for the wheels in Austin for the purposes of lowering the vehicle floor would defeat the benefits achieved by Austin of raising the floor to improve the safety factor and to provide a sense of increased security for passengers. Thus, there is no motivation or suggestion to modify Austin with Quartullo.

There is also no motivation or suggestion to modify Austin with Van Dest. The examiner admits that neither Austin nor Quartullo teach an electric motor with a gear set for driving a planetary gear set at a wheel, and relies on Van Dest to teach the use of gear set (13, 14, 18, 19) for driving a planetary gear set (6, 7, 8) located in the wheel hub. The examiner argues it would be obvious to provide a planetary gear set as taught by Van Dest, driven by the gear set of Austin as modified by Quartullo, for the purpose of reducing the wheel running speed, and allowing higher speed motors to be employed.

To modify Austin to include planetary gear sets at the driving wheels as taught by Van Dest would further defeat the benefits achieved by Austin. As discussed above, Austin eliminated bulky wheel housings for specific reasons. The examiner seeks to modify Austin with Quartullo to include electric motor and gear mechanisms at each wheel, which would increase the size of the Austin wheel housing. To add planetary gear sets to Austin as taught by Van Dest would further increase the size of the wheel housing. This defeats the benefit achieved by Austin of eliminating bulky wheel housings. To increase the size of the wheel housings by adding motor components, drive gear sets, planetary gear sets, and connecting elements at each wheel, would clearly interfere and occupy space useful for payload, defeating the benefit achieved by Austin.

Thus, for the reasons set forth above, Appellant asserts that the rejection of claim 48 under 35 U.S.C. 103(a) is improper and must be withdrawn.

Closing

For the reasons set forth above, the rejection of all claims is improper and should be reversed. Appellant earnestly requests such an action.

Respectfully submitted,

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Dated: January 22, 2004

CERTIFICATE OF MAILING

I hereby certify that the Appeal Brief (in triplicate) and fees is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Mail Stop Appeal Brief - Patents, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on January 22, 2004.

Theresa M. Palmateer

CLAIM APPENDIX

23. An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation; and

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation.

24. An assembly as set forth in Claim 23 wherein said planetary gear sets are incorporated into said wheel hubs.

25. An assembly as set forth in Claim 23, including a first gearbox for housing said first gear set and a second gearbox for housing said second gear set, said first and second gearboxes being mounted to said first and second electric motors respectively and wherein said first and second planetary gear sets are incorporated into first and second gearboxes.

26. An assembly as set forth in Claim 23, wherein said first gear set includes a first pinion gear in driving engagement with a first ring gear mounted for rotation with said first wheel hub and said second gear set includes a second pinion gear in driving engagement with a second ring gear mounted for rotation with said second wheel hub.

27. An assembly as set forth in Claim 26, wherein said first planetary gear set includes a first sun gear mounted for rotation with said first ring gear and a first plurality of planet gears in meshing engagement with a first planetary ring gear hub and said second planetary gear set includes a second sun gear mounted for rotation with said second ring gear and a second plurality of planet gears in meshing engagement with a second planetary ring gear hub.

28. An assembly as set forth in Claim 27, wherein said first planetary ring gear hub drives said first wheel hub and said second planetary ring gear hub drives said second wheel hub.

29. An assembly as set forth in Claim 27, wherein said first planetary ring gear hub drives said first driving axle shaft and said second planetary ring gear hub drives said second driving axle shaft.

30. An assembly as set forth in Claim 29, wherein said first planetary ring gear hub is integrally formed with said first driving axle shaft as one piece and said second planetary ring gear hub is integrally formed with said second driving axle shaft as one piece.

31. An assembly as set forth in Claim 30, wherein said first gear set and said first planetary gear set are housed within a first common gearbox mounted to said first electric motor and said second gear set and said second planetary gear set are housed within a second common gearbox mounted to said second electric motor.

32. An assembly as set forth in Claim 23, including a third electric motor in parallel driving relationship with said first electric motor to drive said first gear set and a fourth electric motor in parallel driving relationship with said second electric motor to drive said second gear set wherein said first and third electric motors drive said first gear set and said second and fourth electric motors drive said second gear set independently from each other.

33. An assembly as set forth in Claim 32, wherein said first and said third electric motors extend radially from said first gear set, and said second and said fourth electric motors extend radially from said second gear set.

34. An assembly as set forth in Claim 33, wherein said first gear set includes a first pinion gear driven by said first electric motor and a second pinion gear driven by said third electric motor, said first and second pinion gears for simultaneously driving a first ring gear and wherein said second gear set includes a third pinion gear driven by said second electric motor and a fourth pinion gear driven by said fourth electric motor, said third and fourth pinion gears for simultaneously driving a second ring gear.

35. An assembly as set forth in Claim 34, wherein said first gear set is housed within a first gearbox mounted to said first and third electric motors and said second gear set is housed within a second gearbox mounted to said second and fourth electric motors.

36. An assembly as set forth in Claim 23, wherein said first and second longitudinal axes of rotation are perpendicular to said lateral axis of rotation.

37. An assembly as set forth in Claim 23, wherein one of said electric motors is mounted at a 90 degree angle extending generally horizontally and forwardly relative to said lateral axis of rotation and the other of said electric motors is mounted at a 90 degree angle extending generally horizontally and rearwardly relative to said lateral axis of rotation.

38. An assembly as set forth in Claim 23, wherein said first and second electric motors are supported by a common axle housing extending along said lateral axis of rotation.

39. An assembly as set forth in Claim 23, wherein said first and second motors are mounted at a 90 degree angle extending generally vertically and upwardly from said lateral axis of rotation.

40. An assembly as set forth in Claim 23, wherein said first and second motors are mounted at an angle extending generally horizontally and rearwardly from said lateral axis of rotation.

41. An automotive vehicle drive unit assembly comprising:

first and second driving axle shafts being co-linear and defining a lateral axis of rotation;

first and second wheel hubs driven by said first and second driving axle shafts respectively about said lateral axis of rotation;

a first gear set for driving said first wheel hub;

a second gear set for driving said second wheel hub;

first and second planetary gear sets driven by said first and second gear sets about said lateral axis of rotation;

a first electric motor for driving said first gear set and defining a first longitudinal axis of rotation that is transverse to said lateral axis of rotation;

a second electric motor for driving said second gear set and defining a second longitudinal axis of rotation that is transverse to said lateral axis of rotation and spaced apart from said first longitudinal axis of rotation;

a third electric motor in parallel driving relationship with said first electric motor to drive said first gear set; and

a fourth electric motor in parallel driving relationship with said second electric motor to drive said second gear set wherein said first and third electric motors drive said first gear set and said second and fourth electric motors drive said second gear set independently from each other.

43. An assembly as set forth in Claim 41, wherein said first gear set is housed within a first gearbox mounted to said first and third electric motors and said second gear set is housed within a second gearbox mounted to said second and fourth electric motors

44. An assembly as set forth in Claim 43, wherein said first gear set includes a first pinion gear in driving engagement with a first ring gear mounted for rotation with said first wheel hub and said second gear set includes a second pinion gear in driving engagement with a second ring gear mounted for rotation with said second wheel hub.

45. An assembly as set forth in Claim 44, wherein said first planetary gear set includes a first sun gear mounted for rotation with said first ring gear and a first plurality of planet gears in meshing engagement with a first planetary ring gear hub and said second planetary gear set includes a second sun gear mounted for rotation with said second ring gear and a second plurality of planet gears in meshing engagement with a second planetary ring gear hub.

46. An assembly as set forth in Claim 41 wherein said third electric motor defines a third longitudinal axis of rotation that is co-linear with said first longitudinal axis of rotation and said fourth electric motor defines a fourth axis of rotation that is co-linear with said second longitudinal axis of rotation.

48. A vehicle comprising:

a vehicle body extending between lateral sides, passenger seats being mounted adjacent each of said lateral sides, a floor defined beneath said passenger seats, an aisle defined between said passenger seats, and said floor also extending beneath said aisle;

at least one driving axle for driving a pair of laterally spaced wheels including a first drive axle shaft associated with the first of said wheels, and a second drive axle shaft associated with the second of said wheels, said first and second drive axle shafts defining a lateral axis of rotation;

a first gear set and a second gear set for driving said first and second wheels;

a first planetary gear set and a second planetary gear set driven by said first and second gear sets about said lateral axis of rotation;

a first electric motor mounted at a non-parallel angle relative to said axis of rotation of said first drive axle shaft for driving said first gear set, and a second electric motor mounted at a non-parallel angle relative to said axis of rotation of said second drive axle shaft and operatively connected to drive said second gear set wherein said first and second electric motors drive said first and second planetary gear sets to move a vehicle along a ground surface in a direction transverse to said lateral axis of rotation; and

said electric motors being mounted adjacent to said wheels at a vertical position which is higher than a vertical position of the floor of said aisle.

49. A vehicle as set forth in Claim 48, including a third electric motor mounted in parallel driving relationship with said first electric motor to assist in driving said first gear set and a fourth electric motor mounted in parallel driving relationship with said second electric motor to assist in driving said second gear set.

50. A vehicle as set forth in Claim 49, wherein said first planetary gear set is driven by said first and third electric motors via said first gear set for speed reduction at said first wheel and said second planetary gear set is driven by said second and fourth electric motors via said second gear set for speed reduction at said second wheel.

51. An assembly as set forth in Claim 23 including

a first motor output shaft rotatable about said first longitudinal axis of rotation and a second motor output shaft rotatable about said second longitudinal axis of rotation;

said first gear set including a first pinion gear driven by said first motor output shaft and mounted for rotation about said first longitudinal axis and a first ring gear driven by said first pinion gear about said lateral axis of rotation;

said first planetary gear set including a first sun gear coupled for rotation with said first ring gear about said lateral axis of rotation;

said second gear set including a second pinion gear driven by said second motor output shaft and mounted for rotation about said second longitudinal axis and a second ring gear driven by said second pinion gear about said lateral axis of rotation; and

said second planetary gear set includes a second sun gear coupled for rotation with said second ring gear about said lateral axis of rotation.

52. An assembly as set forth in claim 51 wherein said first sun gear is directly coupled to said first ring gear and said second sun gear is directly coupled to said second ring gear.

53. An assembly as set forth in claim 51 wherein said first driving axle shaft is driven by said first ring gear and said first sun gear is driven by said first driving axle shaft and said second driving axle shaft is driven by said second ring gear and said second sun gear is driven by said second driving axle shaft.

54. An assembly as set forth in claim 51 wherein said first planetary gear set is positioned adjacent to said first motor output shaft and between said first ring gear and said first driving axle shaft and wherein said second planetary gear set is positioned adjacent to said second motor output shaft and between said second ring gear and said second driving axle shaft.

55. An assembly as set forth in claim 51 wherein said first planetary gear set is positioned adjacent to said first wheel hub at a distal end of said first driving axle shaft and said second planetary gear set is positioned adjacent to said second wheel hub at a distal end of said second driving axle shaft.

57. An assembly as set forth in claim 23 including a first motor output shaft rotatable about said first longitudinal axis of rotation and directly coupled to said first gear set and a second motor output shaft rotatable about said second longitudinal axis of rotation and directly coupled to said second gear set such that said first and second longitudinal axes of rotation intersect said lateral axis of rotation.

58. A vehicle as set forth in claim 48 including a first motor output shaft rotatable about a first longitudinal axis of rotation and directly coupled to said first gear set and a second motor output shaft rotatable about a second longitudinal axis of rotation and directly coupled to said second gear set such that said first and second longitudinal axes of rotation intersect said lateral axis of rotation.

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